NAVSHIPS 91066

INSTRUCTION BOOK
FOR
POWER SUPPLY
PP-338/U

TDE-

THE HALLICRAFTERS COMPANY
CHICAGO, ILLINOIS

BUREAU OF SHIPS NAVY DEPARTMENT

NAVSHIPS 91066

INSTRUCTION BOOK

FOR

POWER SUPPLY PP-338/U

THE HALLICRAFTERS COMPANY

CHICAGO, ILLINOIS

BUREAU OF SHIPS NAVY DEPARTMENT

Contract: NObsr-39396 Approved by BuShips: 2 March, 1948

LIST OF EFFECTIVE PAGES

PAGE NUMBERS	CHANGE IN EFFECT	PAGE NUMBERS	CHANGE IN EFFECT
Title Page	Original	5-1 to 5-2	Original
A to C	Original	6-1 to 6-1	Original
i to v	Original	7-0 to 7-7	Original
1-0 to 1-2	Original	8-0 to 8-6	Original
2-1 to 2-3	Original		
3-0 to 3-2	Original		

ADDRESS NAVY DEPARTMENT
BUREAU OF SHIPS

REFER TO FILE No.

NAVY DEPARTMENT
BUREAU OF SHIPS
WASHINGTON 25, D.C.

Section 993-100

2 March 1948

To: All Activities concerned with the Installation, Operation and Maintenance of the Subject Equipment.

Subj: Instruction Book for Power Supply PP-338/U (NAVSHIPS 91066)

1. NAVSHIPS 91066 is the instruction book for the subject equipment and is in effect upon receipt.

2. When superseded by a later edition, this publication shall be destroyed.

3. Extracts from this publication may be made to facilitate the preparation of other Navy instruction books and handbooks.

4. All requests for NAVSHIPS electronics publications should be directed to the nearest District Publications and Printing Office. When changes or revised books are distributed, notice will be included in the applicable maintenance bulletin and the ELECTRON Magazine.

E. W. MILLS
Chief of Bureau

FROM BUREAU OF SHIPS

RECORD OF CORRECTIONS MADE

CHANGE NO.	DATE	SIGNATURE OF OFFICER MAKING CORRECTION

TABLE OF CONTENTS

SECTION 1—GENERAL DESCRIPTION

Paragraph		*Page*
1.	Purpose and Basic Principles	1-1
2.	Physical Description	1-1
3.	Reference Data	1-1

SECTION 2—THEORY OF OPERATION

1.	General Description of Circuits	2-1
2.	Circuit Analysis	2-1

SECTION 3—INSTALLATION

1.	Unpacking	3-0
2.	Installation	3-0
3.	Initial Adjustments	3-2

SECTION 4—OPERATION

1.	General	5-1
2.	Starting and Stopping the Converted Model TDE Series Equipment	5-1
3.	Remote Operation with Converted Model TDE Series Equipment	5-1

SECTION 5—OPERATOR'S MAINTENANCE

Paragraph		*Page*
1.	Scope	5-1
2.	Tube Replacement	5-1
3.	Fuse Failure	5-2

SECTION 6—PREVENTIVE MAINTENANCE

SECTION 7—CORRECTIVE MAINTENANCE

1.	Trouble Shooting	7-1
2.	Relay Maintenance	7-4
3.	Tube Maintenance	7-4

SECTION 8—PARTS LIST

REPORT OF FAILURE

Report of failure of any part of this equipment, during its entire service life, shall be made to the Bureau of Ships in accordance with current regulations using form NAVSHIPS NBS 383 (revised) except for Marine Corps equipment, in which case the "Signal Equipment Failure Report" form shall be used and distributed in accordance with instructions pertaining thereto. The report shall cover all details of the failure and give the date of installation of the equipment. For procedure in reporting failures see Chapter 67 of the *Bureau of Ships Manual* or superseding instructions.

ORDERING PARTS

All requests or requisitions for replacement material should include the following data:

1. Federal stock number or, when ordering from a Marine Corps or Signal Corps supply depot, the Signal Corps stock number.
2. Name and short description of part.

If the appropriate stock number is not available the following shall be specified:

1. Equipment model or type designation, circuit symbol, and item number.
2. Name of part and complete description.
3. Manufacturer's designation.
4. Contractor's drawing and part number.
5. JAN or Navy type number.

SAFETY NOTICE

The attention of officers and operating personnel is directed to Chapter 67 of the *Bureau of Ships Manual* or superseding instructions on the subject of radio-safety precautions to be observed.

This equipment employs voltage which are dangerous and may be fatal if contacted by operating personnel. Extreme caution should be exercised when working with the equipment.

While every practicable safety precaution has been incorporated in this equipment, the following rules must be strictly observed:

KEEP AWAY FROM LIVE CIRCUITS:

Operating personnel must at all time observe all safety regulations. Do not change tubes or make adjustments inside equipment with high voltage supply on. Under certain conditions dangerous potentials may exist in circuits with power controls in the off position due to charges retained by capacitors. To avoid casualties always remove power and discharge and ground circuits prior to touching them.

DON'T SERVICE OR ADJUST ALONE:

Under no circumstances should any person reach within or enter the enclosure for the purpose of servicing or adjusting the equipment without the immediate presence or assistance of another person capable of rendering aid.

DON'T TAMPER WITH INTERLOCKS:

Do not depend upon door switches or interlocks for protection but always shut down motor generators or other power equipment. Under no circumstances should any access gate, door, or safety interlock switch be removed, short-circuited, or tampered with in any way, by other than authorized maintenance personnel, nor should reliance be placed upon the interlock switches for removing voltages from the equipment.

RESUSCITATION

AN APPROVED POSTER ILLUSTRATING THE RULES FOR RESUSCITATION BY THE PRONE PRESSURE METHOD SHALL BE PROMINENTLY DISPLAYED IN EACH RADIO, RADAR, OR SONAR ENCLOSURE. POSTERS MAY BE OBTAINED UPON REQUEST TO THE BUREAU OF MEDICINE AND SURGERY.

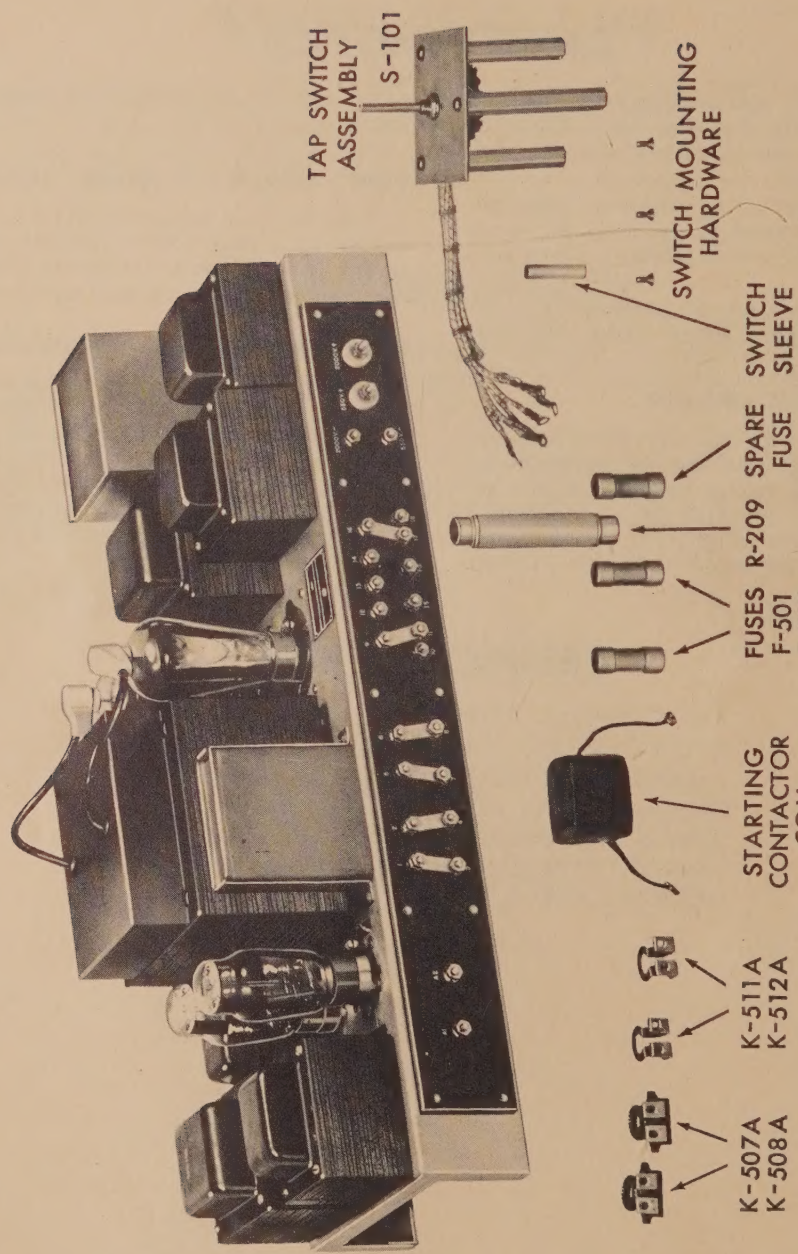


Fig. 1-1. Power Supply PP-338/U and Accessories

SECTION 1
GENERAL DESCRIPTION

1. PURPOSE AND BASIC PRINCIPLES.

Power Supply PP-338/U is designed to modify Navy Model TDE Series Radio Transmitting Equipment for operation from 115/230 V. single phase 60 cycle alternating current (AC) mains. The modification unit employes a transformer rectifier combination to supply power in place of the usual rotary converter. The shape, size, and mounting facilities of Power Supply PP-338/U permits its installation in the space occupied by the motor generator set. All accessory components necessary to convert any Model TDE Series equipment, regardless of the power source for which it was set up, is supplied in the modification kit. Model TDE Series equipment modified by this kit will be capable of operating from a 115 V. or 230 V., single phase, 60 cycle source.

2. PHYSICAL DESCRIPTION.

The conversion unit consists of a steel chassis upon which are mounted plate and filament transformers, chokes, and filter condensers required to supply the two high voltages (550 V. and 2000 V.) normally supplied by the rotary converter. The chassis is so constructed that it mounts directly in place of the motor generator set, using the same mounting hardware. The terminal board terminals of the power supply are so positioned that the motor generator wiring may be reused without modification of the interconnecting leads.

The field rheostat (R-501) formerly used in the Model TDE Series equipment is replaced by a tapped switch (S-101) supplied with the kit, to control the two plate voltages by auto transformer action in the primary of the 2000 V. plate transformer.

Starting contactor heaters and coil, and line fuses required for the conversion are supplied in the kit. Refer to Figure 1-1. for details.

3. REFERENCE DATA.

a. Nomenclature: Power Supply PP-338/U

b. Contract number: NObsr-39396

c. Contract date: 27 June 1947

d. Contractor: The Hallicrafters Co.
4401 W. 5th Ave.
Chicago, Illinois

e. Cognizant Naval Inspector: Inspector of Naval Material, Chicago, Illinois.

f. Shipping Information:

(1) Number of packages per complete shipment ..... 1.

(2) Height ..... 14 inches

(3) Width ..... 30½ in.

(4) Depth ..... 13½ in.

(5) Cubical Content
(*a*) Uncrated ..... 1.58 cu. ft.
(*b*) *Crated* ..... 3.33 cu. ft.

(6) Weight
(*a*) Uncrated ..... 120 lbs.
(*b*) *Crated* ..... 170 lbs.

(7) Power Supply Requirements:
(*a*) 115 V. or 230 V. ± 10%, single phase, 60 cycles.
(*b*) Power consumption — 700 watts or 875 volt-amperes.
(*c*) Power factor—80%.
(*d*) Load current—7.6 amperes @ 115 V. or 3.8 amperes @ 230 V.
(*e*) Output—2000 V. @ 0.175 ampere and 550 V. @ 0.300 ampere.

TABLE 1-1. EQUIPMENT SUPPLIED

QUANTITY PER EQUIPMENT	NAME OF UNIT	NAVY TYPE DESIGNATION	OVER-ALL DIMENSIONS			VOLUME	WEIGHT
			HEIGHT	WIDTH	DEPTH		
1	Power Supply	PP-338/U	10½	26	10	1.58	120
	Accessories (For list of accessories see Table 8-2)						

Unless otherwise stated, dimensions are inches, volume cubic feet, weight pounds.

TABLE 1-2. EQUIPMENT AND PUBLICATIONS REQUIRED BUT NOT SUPPLIED

QUANTITY PER EQUIPMENT	NAME OF UNIT	NAVY TYPE DESIGNATION	REQUIRED USE
1	Instruction Book for Navy Models TDE, TDE-1, TDE-2.	NAVSHIPS 900,389-IB	Reference
1	Instruction Book for Navy Model TDE-3	NAVSHIPS 95328	Reference

TABLE 1-3. SHIPPING DATA

SHIPPING BOX NUMBER	CONTENTS		OVER-ALL DIMENSIONS			VOLUME	WEIGHT
	NAME	DESIGNATION	HEIGHT	WIDTH	DEPTH		
1	Power Supply	PP-338/U	14	30½	13½	3.33	170

Unless otherwise stated, dimensions are inches, volume cubic feet, weight pounds.

TABLE 1-4. VACUUM TUBE COMPLEMENT

TYPE NUMBER	TUBE TYPE	TOTAL NO. OF TUBES
JAN-866A/866	Half-wave mercury-vapor rectifier	2
JAN-5R4GY	Full-wave high-vacuum rectifier	2

SECTION 2
THEORY OF OPERATION

1. GENERAL DESCRIPTION OF CIRCUITS.

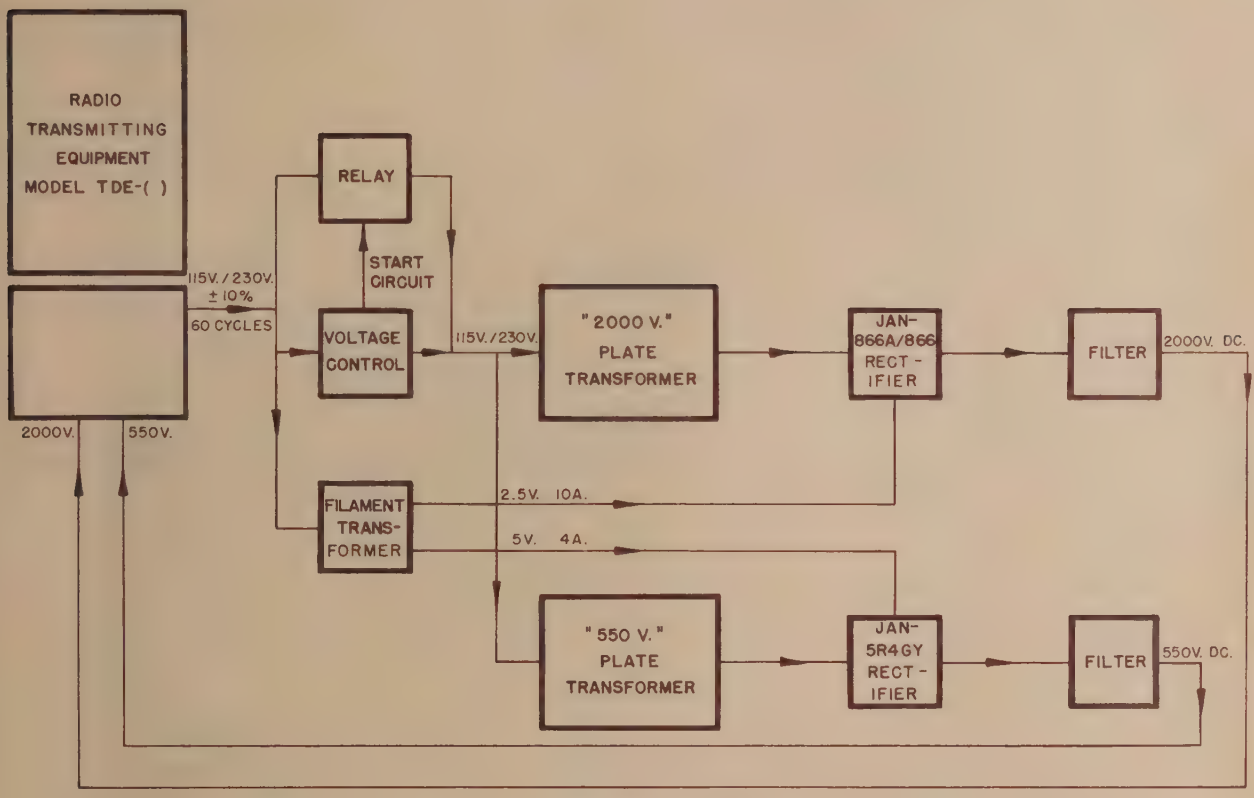


Figure 2-1. Power Supply PP-338/U, Functional Block Diagram

Power Supply PP-338/U consists essentially of two high voltage systems complete with starting relay, manual line voltage control, and smoothing filters to supply the two high voltage d-c circuits of the Model TDE Series Radio Transmitting Equipment normally supplied by the motor generator set.

2. CIRCUIT ANALYSIS.

a. PRIMARY CIRCUITS.

(1) The two 115 V. primary windings on each of the three transformers, two plate power and one filament power, permit operation from a 115 V. or 230 V., single phase, 60 cycle AC power source by connecting them in parallel for 115 V. operation or in series for 230 V. operation. Series or parallel operation is provided for by adjustable links located on the terminal board of the power supply.

(2) Plate transformer T-101 has an additional tapped primary winding which operates as an auto transformer in conjunction with the two 115 V. primaries. This auto transformer action provides for 10 per cent (plus or minus) variation in the line voltage so that the 2000 V. and 550 V. potentials may be maintained. The plate voltage adjustment is manually controlled by the tapped switch S-101 which is connected to the auto transformer winding on plate transformer T-101.

(3) The starting relay K-101 permits the tube filaments of the rectifiers to reach operating temperature before applying full plate voltage by making it necessary for the operator to set the PLATE voltage switch (S-101) at position one to energize the relay. After energizing the relay the PLATE voltage switch is then set for a PLATE meter reading of 2. (2000 V.)

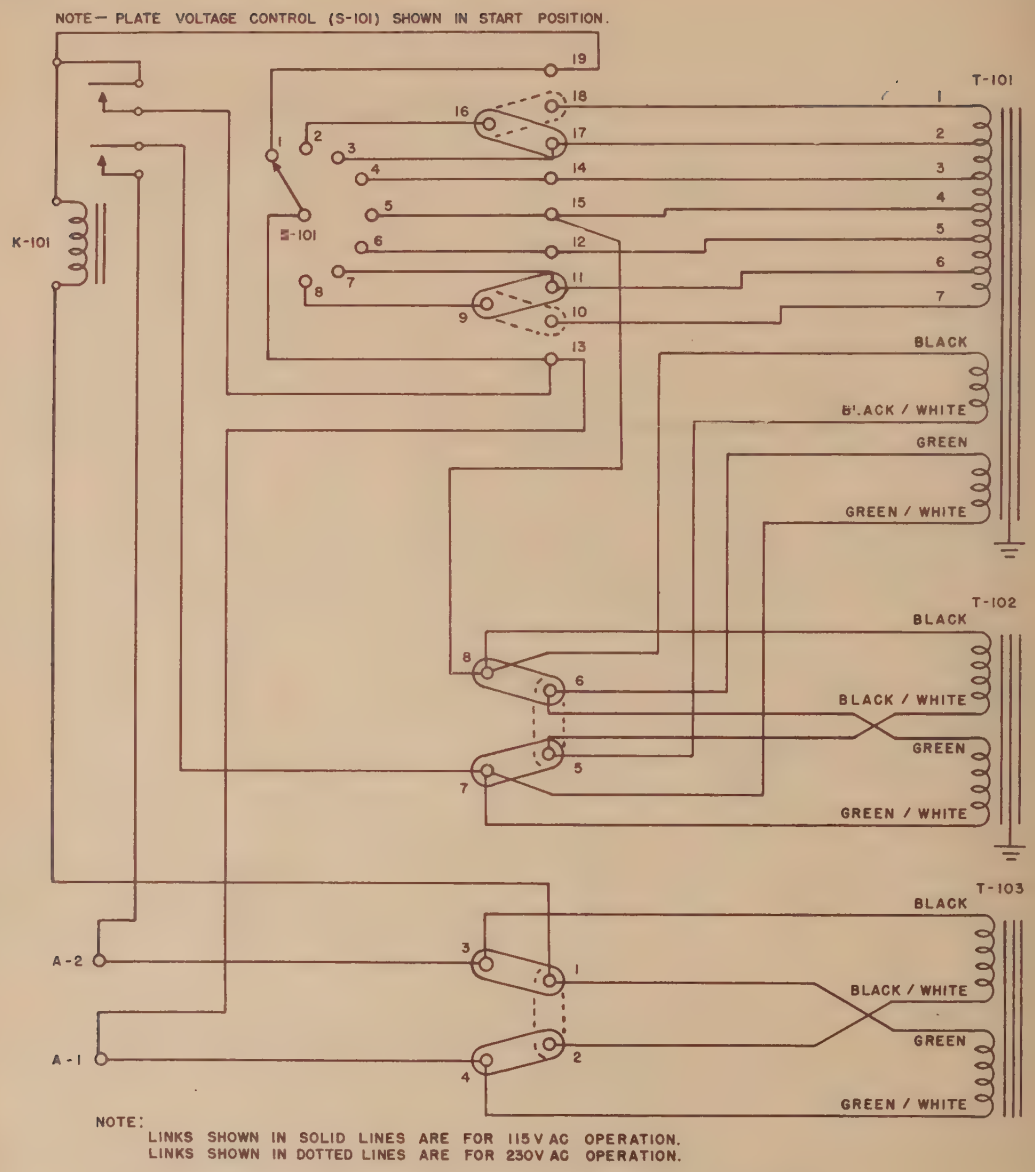


Figure 2-2. Primary Circuits, Unit Schematic Diagram

b. RECTIFIER AND FILTER CIRCUITS.

The two high voltage systems are essentially the same, both being of the conventional full-wave rectifier type. Transformer T-103 supplies filament power for both sets of rectifier tubes, having separate filament windings for each pair of tubes. Refer to Figure 2-3.

The 2000 V. supply is filtered by two "L" section filters, the first section consisting of a 8 to 25-henry swinging choke (L-101) and a 4 mfd. capacitor (C-101) and the second section consisting of a 5-henry smoothing choke (L-102) in the power supply and a 3 mfd. capacitor (C-502) located in the transmitter unit. The 50,000-ohm bleeder resistor R-101 acts to discharge the capacitors in the filter system as well as provide improved voltage regulation.

The 550 V. supply is also filtered by two "L" section filters, the first section consisting of a 4 to 8-henry swinging choke (L-103) and 8 mfd. capacitor (C-102) and the second section consisting of a 5-henry smoothing choke (L-104) in the power supply and a 3 mfd. capacitor (C-503) located in the transmitter unit. The bleeder resistors for this supply voltage, (R-107 and R-108) for IF and (R-305 and R-308) for HF, are located in the transmitter unit.

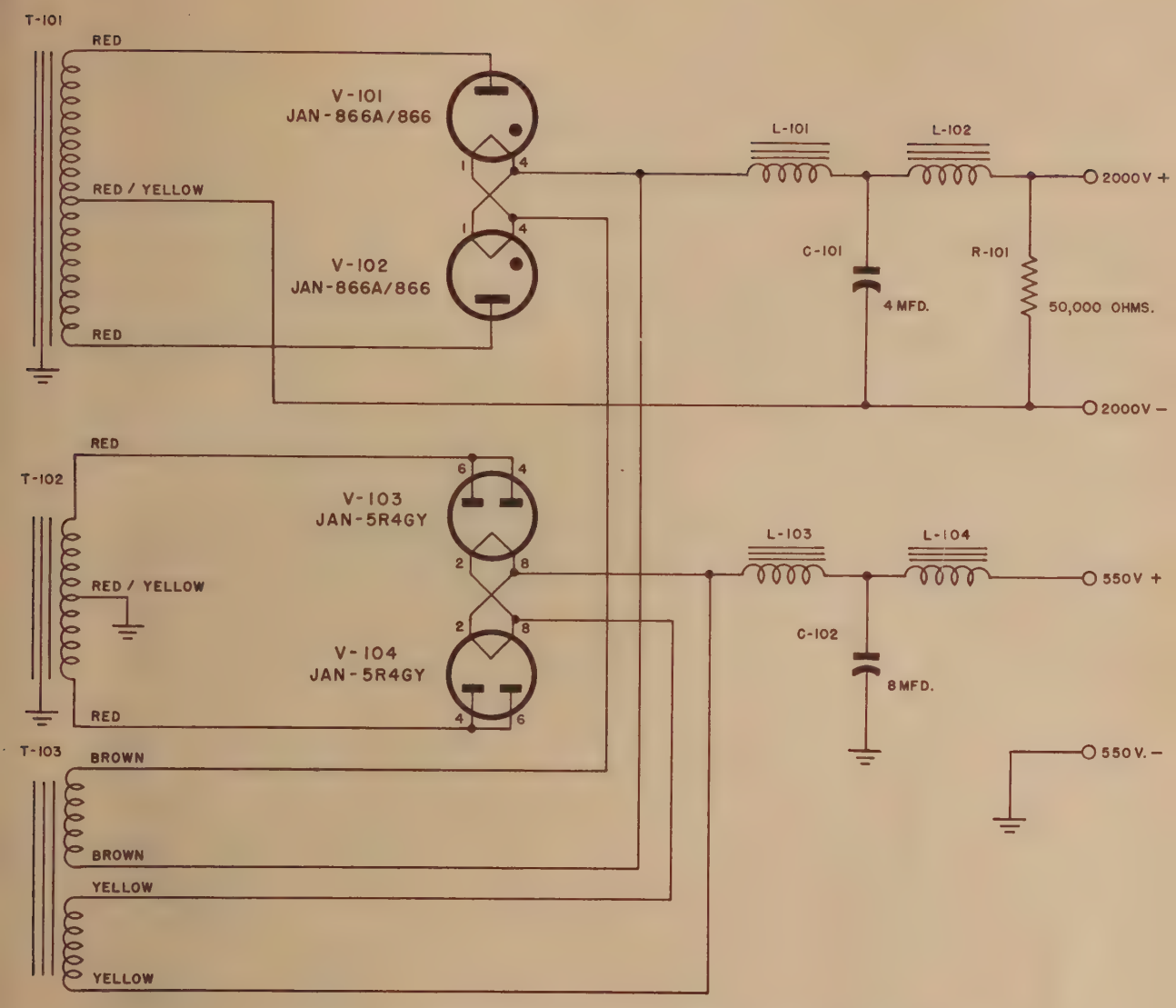


Figure 2-3. Rectifier and Filter Circuits, Unit Schematic Diagram

SECTION 3
INSTALLATION

1. UNPACKING.

Keep the shipping container in the upright position when unpacking the equipment. An arrow or warning notice is stenciled on the container. Refer to Table 1-1., Equipment Supplied, and check the contents of the kit. See Figure 1-1. Report any discrepancies to the commanding officer in charge.

2. INSTALLATION.

WARNING

DISCONNECT POWER FROM THE TRANSMITTER AND DISCHARGE THE HIGH VOLTAGE CONDENSERS BEFORE PERFORMING ANY SERVICING OPERATION WITHIN THE POWER UNIT. SIMPLY TURNING OFF THE TRANSMITTER IS NOT SUFFICIENT, DISCONNECT THE POWER LINE COMPLETELY.

a. Remove motor generator unit as follows:

(1) Remove the power unit's front access panel, left and right side panels and right brace to gain access to the motor generator unit.

(2) Disconnect all cable connections from motor generator to transmitter at the motor generator terminal boards.

(3) Remove four mounting bolts holding motor generator frame to the four shock mounts. Lay hardware aside for use in mounting Power Supply PP-338/U.

b. Install Power Supply PP-338/U with the terminal board facing the front and bolt chassis to shock mounts with the four bolts previously used to hold the motor generator in place. Note that one of the mountings has a ground strap which must be connected to properly ground the power supply chassis.

c. Connect the six power leads to the power supply terminal board as follows:

TABLE 3-1. POWER SUPPLY PP-338/U TERMINAL CONNECTIONS

LEAD FROM POWER UNIT TERMINAL NO.	CONNECT TO POWER SUPPLY PP-338/U TERMINAL NO.
TS9-3	A-1
TS9-4	A-2
TS8-LVA	550 V.−
TS8-HV	2000 V.−
TS8-LV+L	550 V.+
TS8-HV+	2000 V.+

Note—Remove any remaining motor generator leads which may have been connected to terminals TS9-1, TS9-2, TS9-5, and TS8-LVF on some installations.

d. Rework field rheostat unit (R-501) as follows:

(1) Disconnect field rheostat leads from terminals TS11-37 and TS11-38.

(2) Drive out groove pin holding field rheostat knob to shaft and remove knob from shaft. Retain knob and pin for reinstallation.

(3) Remove ten screws holding field rheostat protective cover in place and lift cover clear. Retain cover and mounting hardware for reinstallation.

(4) Remove the three housing and field rheostat mounting screws, and remove the field rheostat. Discard the rheostat but retain the housing and mounting hardware for reinstallation.

(5) Mount tap switch assembly S-101 to the field rheostat housing using the three flat head screws supplied with the conversion kit. Use the three holes in the housing that are countersunk from the back side and position the switch so that the wiring attached to the switch passes down through the cable hole in the housing.

(6) Reinstall the housing using the original hardware.

(7) Reinstall the cover using the original hardware.

(8) Set the tap switch shaft at position 5 and slip the sleeve supplied with the kit on to the switch shaft.

(9) Place the field rheostat knob in position, rotating the handle so that its longest dimension is horizontal.

(10) With a 1/8-inch drill, bore a hole 90 degrees away from the original groove pin hole and drive the groove pin home.

(11) Connect the coded leads from the tap switch to similarly coded terminals on the power supply terminal strip.

e. Modify the magnetic starter unit as follows:

(1) Remove starting contactor coil (Ref. K-501A, K-502A, K-503A, or K-504A) and replace with starting contactor coil (K-513) supplied with kit.

(2) The heater elements which are used in relays K-501, K-502, K-503, or K-504, must be checked against the following table to be absolutely positive that the correct elements are used for the power source from which the transmitter is to be operated. Two of each type heater coil are supplied with the kit.

TABLE 3-2. HEATER COIL REQUIREMENTS

Supply Voltage	115/1/60	230/1/60
Heater Symbol	K-511A K-512A	K-507A K-508A
Style Number	966493	966486
* Style Number	966494	

* Substitute heater coil which may be supplied with kit.

(3) Disconnect the two leads connected to terminal 12 and reconnect them to terminal 11 in the magnetic starter unit. Refer to NAVSHIPS 900,389-IB, instruction book for TDE-1 & 2, Figure 8-30, and NAVSHIPS 95328 instruction book for TDE-3, Figure 20.

f. Check indicator light resistor. Resistor R-209 must be in place. If resistor R-215 is installed, replace with resistor R-209 supplied with kit. Refer to NAVSHIPS 900,389-IB Section III, instruction book for TDE-1 and 2, and NAVSHIPS 95328 instruction book for TDE-3.

g. Check link switches and transformer links for 115/1/60 operation or 230/1/60 operation whichever is to be used. Refer to charts shown in NAVSHIPS 900,-389-IB, Section III, instruction book for TDE-1 and 2, and NAVSHIPS 95328, instruction book for TDE-3.

h. Check and set the link switches on Power Supply PP-338/U for the power source to be used. Refer to the following table or Figures 3-1 and 3-2 for the proper link positions.

TABLE 3-3. POWER SUPPLY PP-338/U LINK ADJUSTMENTS

SUPPLY VOLTAGE	LINK POSITIONS					
115/1/60	1 to 3	2 to 4	5 to 7	6 to 8	9 to 11	16 to 17
230/1/60	1 to 2	5 to 6	9 to 10	16 to 18		

Figure 3-1. Power supply link connections for 115 V., single phase, 60 cycle operation.

Figure 3-2. Power supply link connections for 230 V., single phase, 60 cycle operation.

3. INITIAL ADJUSTMENTS.

There are no adjustments required following the installation of the power supply. After checking over the installation procedure to make sure that it is complete and workable, proceed with normal operational tests using the modifications in operating technique outlined in Section 4, Operation.

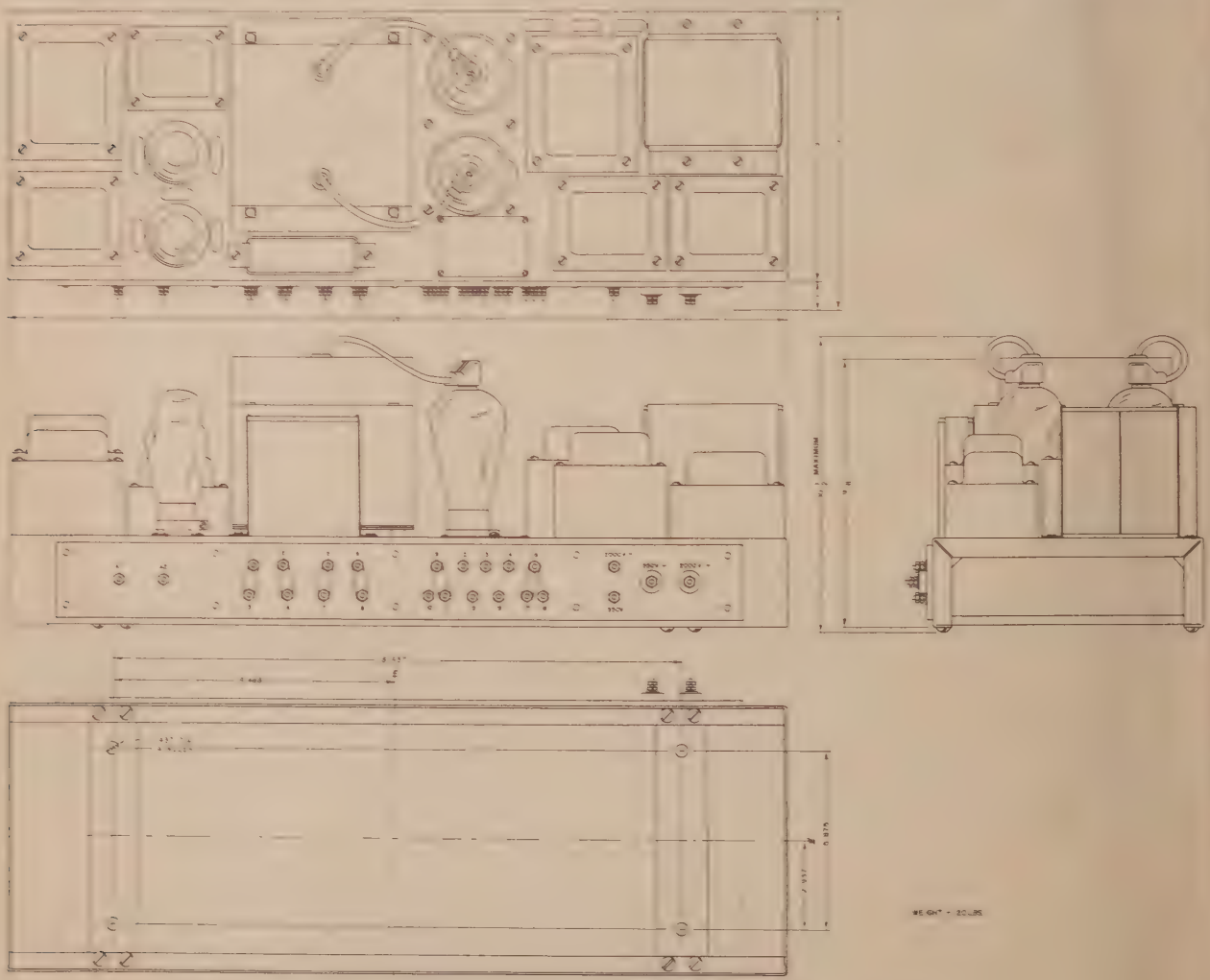


Figure 3-3. Outline Dimensions of Power Supply PP-338/U.

SECTION 4
OPERATION

1. GENERAL.

The operation of the Model TDE Series Radio Transmitting Equipment is carried out in general as described in NAVSHIPS 900,389-IB, Instruction Book for NAVY MODELS TDE, TDE-1, TDE-2, and in NAVSHIPS 95328, Instruction Book for NAVY MODEL TDE-3. The starting procedure requires an additional operation of the PLATE control as described below.

2. STARTING AND STOPPING THE CONVERTED MODEL TDE SERIES EQUIPMENT.

Disregard all reference to starting procedure outlined in the instruction books when *starting the modified unit.* Starting is carried out as follows:

a. Set REMOTE-LOCAL switch (S-203) at LOCAL.

b. Set START-STOP switch (S-204) at START and allow 30 seconds for warm up before proceeding.

c. Turn the PLATE control (S-101) to the left to its left hand stop or number one position.

d. Set PLATE control (S-101) for a reading on the PLATE meter as near 2 (2000 V.) as the control will permit.

e. To stop the equipment, set the START-STOP switch (S-204) at STOP.

3. REMOTE OPERATION WITH CONVERTED MODEL TDE SERIES EQUIPMENT.

After starting the equipment, remote operation is provided by setting the REMOTE-LOCAL switch (S-203) at REMOTE. All remote operation functions may be carried out in a normal manner except that of starting the equipment, since the PLATE control (S-101) must be returned to its number one position each time the equipment is started as outlined above.

SECTION 5
OPERATOR'S MAINTENANCE

1. SCOPE.

Maintenance operations which can be performed by the operator for the Power Supply PP-338/U are confined mainly to replacement of tubes. The locations of the tubes are shown in Figure 5-1.

2. TUBE REPLACEMENT.

The rectifier tubes employed by the power supply are accessible, on converted Model TDE Series equipment, through the front panel of the power unit.

Replacement of tubes requires the use of a small screwdriver to open the tube clamp before lifting the tubes clear of the socket. The JAN-866A/866 tubes are equipped with plate cap connections which must be disengaged before pulling the tubes for replacement. Reclamp the tube bases after installing the new tubes.

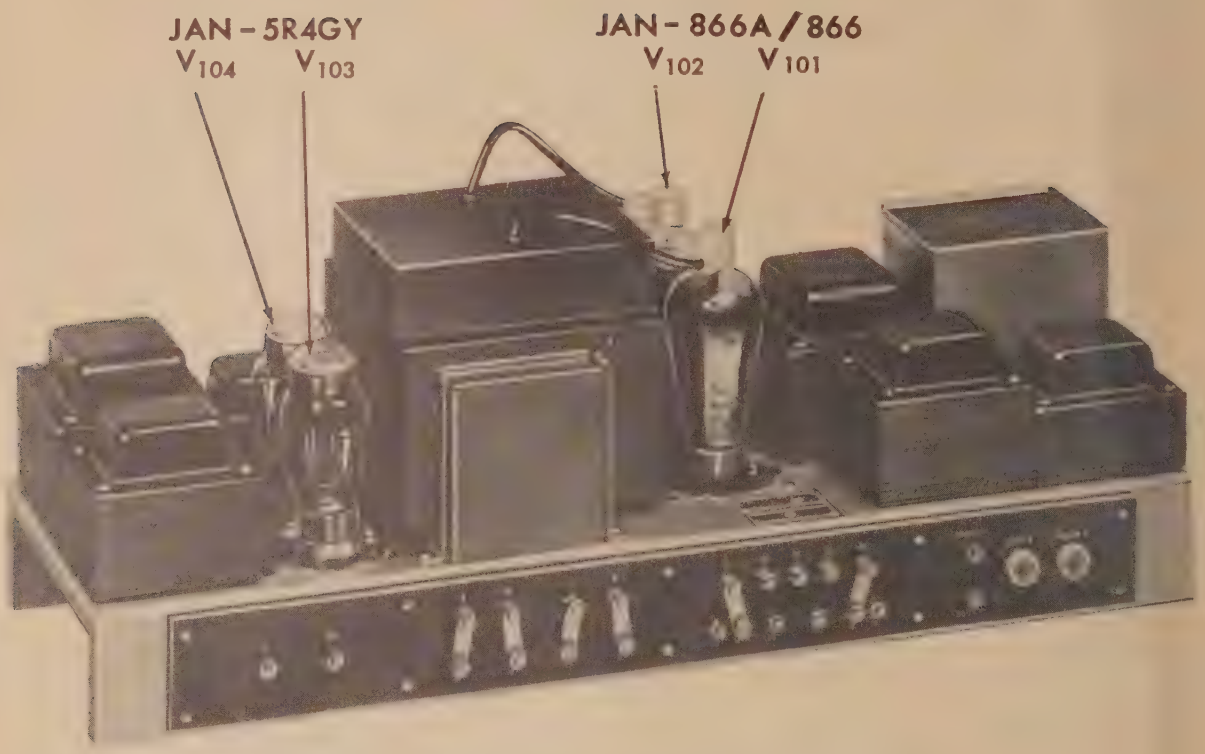


Figure 5-1. Power Supply PP-338/U, Tube Locations.

CAUTION

During operation of the power supply, the tubes become hot enough to cause a burn if touched. If the transmitter has just been turned off, do not grasp any tube until it has cooled to a safe temperature.

Note

ALL TUBES OF A GIVEN TYPE SUPPLIED WITH THE EQUIPMENT SHALL BE CONSUMED PRIOR TO EMPLOYMENT OF TUBES FROM GENERAL STOCK.

3. FUSE FAILURE.

Refer to NAVSHIPS 900,389-IB, Instruction Book for NAVY MODELS TDE, TDE-1, TDE-2, and to NAVSHIPS 95328, the instruction for the NAVY MODEL TDE-3 equipment, for fuse data other than fuse replacement outlined below for modified equipment.

TABLE 5-1. FUSE LOCATIONS

SYMBOL	LOCATION	PROTECTS
* F-501 and * F-502	Directly behind access cover on power unit of Model TDE-( ) Equipment	Main line
Spare	Back side of access door	

* Note—Refer to instruction books for circuit symbols.

SECTION 6
PREVENTIVE MAINTENANCE

THE ATTENTION OF MAINTENANCE PERSONNEL IS INVITED TO THE REQUIREMENTS OF CHAPTER 67 OF THE *BUREAU OF SHIPS MANUAL* OF THE LATEST ISSUE.

WARNING

DISCONNECT POWER FROM THE TRANSMITTER BEFORE PERFORMING ANY SERVICING OPERATION WITHIN THE POWER UNIT

MAINTENANCE SCHEDULE

DAILY CHECK	PROCEDURE
Tubes	Check meter readings daily. Any gradual change in the rectifier tubes will be indicated by a gradual change in plate current and voltage at the transmitter.
WEEKLY CHECK	**PROCEDURE**
Power Supply	Clean externally along with the entire transmitter. Check external terminal board connecting leads, they must be firmly held at their terminals.
MONTHLY CHECK	**PROCEDURE**
Tubes	Check tube condition against weekly data and replace either pair of rectifiers if their performance indicates a loss in power.

FAILURE REPORTS

A FAILURE REPORT must be filled out for the failure of any part of the equipment whether caused by defective or worn parts, improper operation, or external influences. It should be made on Failure Report, form NBS-383, which has been designed to simplify this requirement. The card must be filled out and forwarded to BUSHIPS in the franked envelope which is provided. Full instructions are to be found on each card.

Use great care in filling the card out to make certain it carries adequate information. For example, under "Circuit Symbol" use the proper circuit identification taken from the schematic drawings, such as T-803, in the case of a transformer, or R-207, for a resistor. Do not substitute brevity for clarity. Use the back of the card to completely describe the cause of failure and attach an extra piece of paper if necessary.

The purpose of this report is to inform BUSHIPS of the cause and rate of failures. The information is used by the Bureau in the design of future equipment and in the maintenance of adequate supplies to keep the present equipment going. The cards you send in, together with those from hundreds of other ships, furnish a store of information permitting the Bureau to keep in touch with the performance of the equipment of your ship and all other ships of the Navy.

This report is not a requisition. You must request the replacement of parts through your Officer-in-Charge in the usual manner.

Make certain you have a supply of Failure Report cards, and envelopes on board. They may be obtained from any Electronics Officer.

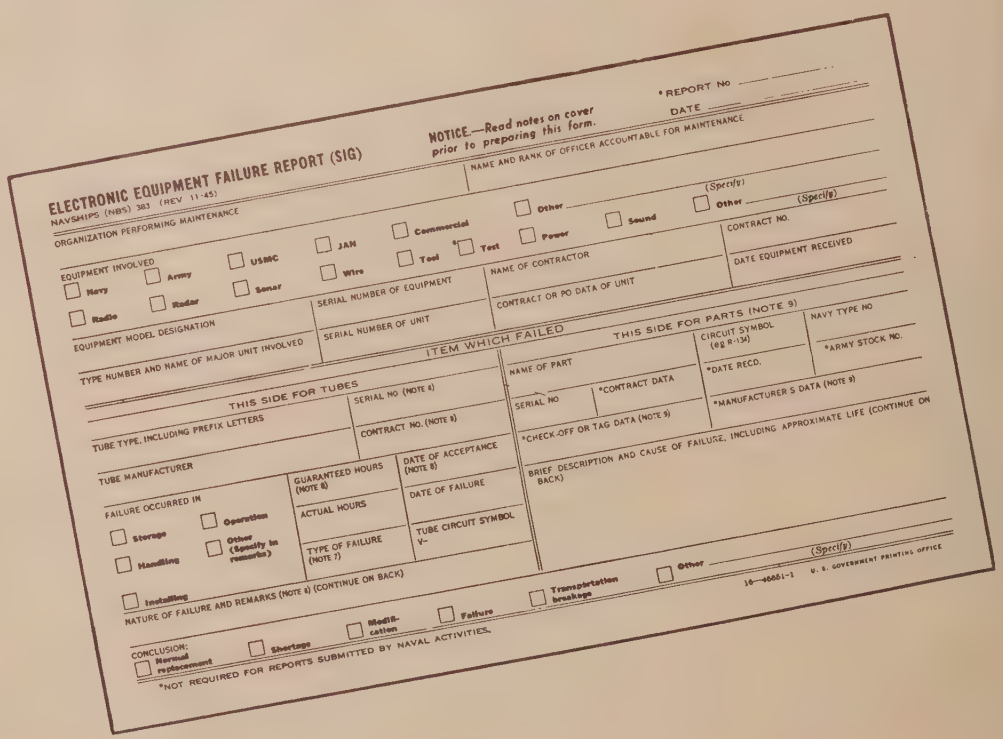

ELECTRONIC EQUIPMENT FAILURE REPORT (SIG)
NAVSHIPS (NBS) 383 (REV 11-45)
NOTICE.—Read notes on cover prior to preparing this form.
*REPORT NO
DATE
NAME AND RANK OF OFFICER ACCOUNTABLE FOR MAINTENANCE
ORGANIZATION PERFORMING MAINTENANCE
EQUIPMENT INVOLVED
Navy
Army
USMC
Radio
Radar
Sonar
JAN
Wire
Commercial
Tool
Test
Other
Power
Sound
Other (Specify)
(Specify)
EQUIPMENT MODEL DESIGNATION
SERIAL NUMBER OF EQUIPMENT
NAME OF CONTRACTOR
CONTRACT NO.
TYPE NUMBER AND NAME OF MAJOR UNIT INVOLVED
SERIAL NUMBER OF UNIT
CONTRACT OR PO DATA OF UNIT
DATE EQUIPMENT RECEIVED
ITEM WHICH FAILED
THIS SIDE FOR TUBES
TUBE TYPE, INCLUDING PREFIX LETTERS
SERIAL NO (NOTE 6)
CONTRACT NO. (NOTE 8)
TUBE MANUFACTURER
THIS SIDE FOR PARTS (NOTE 9)
NAME OF PART
CIRCUIT SYMBOL (eg R-134)
NAVY TYPE NO
SERIAL NO
*CONTRACT DATA
*DATE RECD.
*ARMY STOCK NO.
*MANUFACTURER'S DATA (NOTE 9)
*CHECK-OFF OR TAG DATA (NOTE 9)
FAILURE OCCURRED IN
Storage
Handling
Installing
Operation
Other (Specify in remarks)
GUARANTEED HOURS (NOTE 8)
ACTUAL HOURS
TYPE OF FAILURE (NOTE 7)
DATE OF ACCEPTANCE (NOTE 8)
DATE OF FAILURE
TUBE CIRCUIT SYMBOL V-
BRIEF DESCRIPTION AND CAUSE OF FAILURE, INCLUDING APPROXIMATE LIFE (CONTINUE ON BACK)
NATURE OF FAILURE AND REMARKS (NOTE 6) (CONTINUE ON BACK)
CONCLUSION:
Normal replacement
Shortage
Modification
Failure
Transportation breakage
Other (Specify)
*NOT REQUIRED FOR REPORTS SUBMITTED BY NAVAL ACTIVITIES.
16—46661-1 U. S. GOVERNMENT PRINTING OFFICE

Figure 7–1. Failure Report, Sample Form

SECTION 7
CORRECTIVE MAINTENANCE

1. TROUBLE SHOOTING.

When trouble occurs in the power supply, it may be possible to find the defective component most quickly by referring to Table 7-1, Trouble Shooting Chart. This chart suggests components of the power supply which are likely to cause the symptoms listed. If with the aid of the Trouble Shooting Chart the trouble is not located, a systematic check of voltages at the terminal board of the equipment should be made. When a voltage is discovered to be low or zero, check the resistance of the various components of the associated circuit. Refer to the voltage and resistance charts, Figures 7-3, 7-4, 7-5 and the overall schematic diagram, Figure 7-6. In general a transformer breakdown will show up either as a total loss of high voltage or as destructive heating of the transformer winding which can be visibly identified.

TABLE 7-1. TROUBLE SHOOTING CHART

PROBABLE TROUBLES	SYMPTOMS	MOST PROBABLE CAUSES
1. No power amplifier plate voltage.	1. PLATE meter reads zero. 2. No excitation to the final stage.	1. PLATE control was not returned to position 1 to engage starting relay in the power supply. 2. Defective 866A/866 tubes. 3. Defective 866A/866 filament circuit. 4. Defective high voltage plate transformer (T-101). 5. Defective voltage control switch (S-101). 6. Defective relay (K-101). 7. Defective chokes (L-101 and L-102). 8. Defective filter capacitor (C-101). 9. Missing interconnecting links on terminal board of power supply.
2. P.A. PLATE meter reads zero.	1. P.A. GRID meter reads zero. 2. I. A. GRID meter reads zero.	1. PLATE control was not returned to position 1 to energize the starting relay in the power supply. 2. Defective 5R4GY tubes. 3. Defective 5R4GY filament circuit. 4. Defective plate transformer (T-102). 5. Defective voltage control switch (S-101). 6. Defective relay (K-101). 7. Defective chokes (L-103 and L-104). 8. Defective filter capacitor (C-102). 9. Missing interconnecting links on terminal board of power supply.

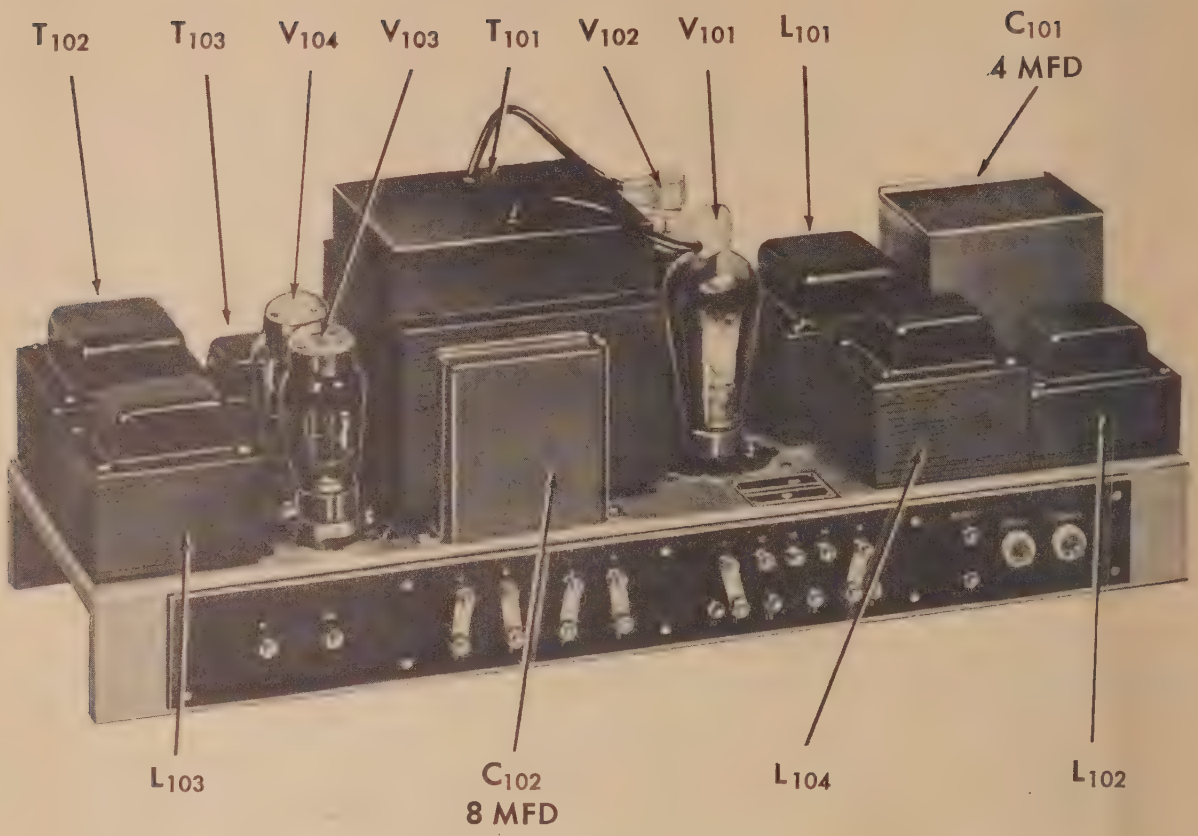


Figure 7-2. Top View, Parts Location.

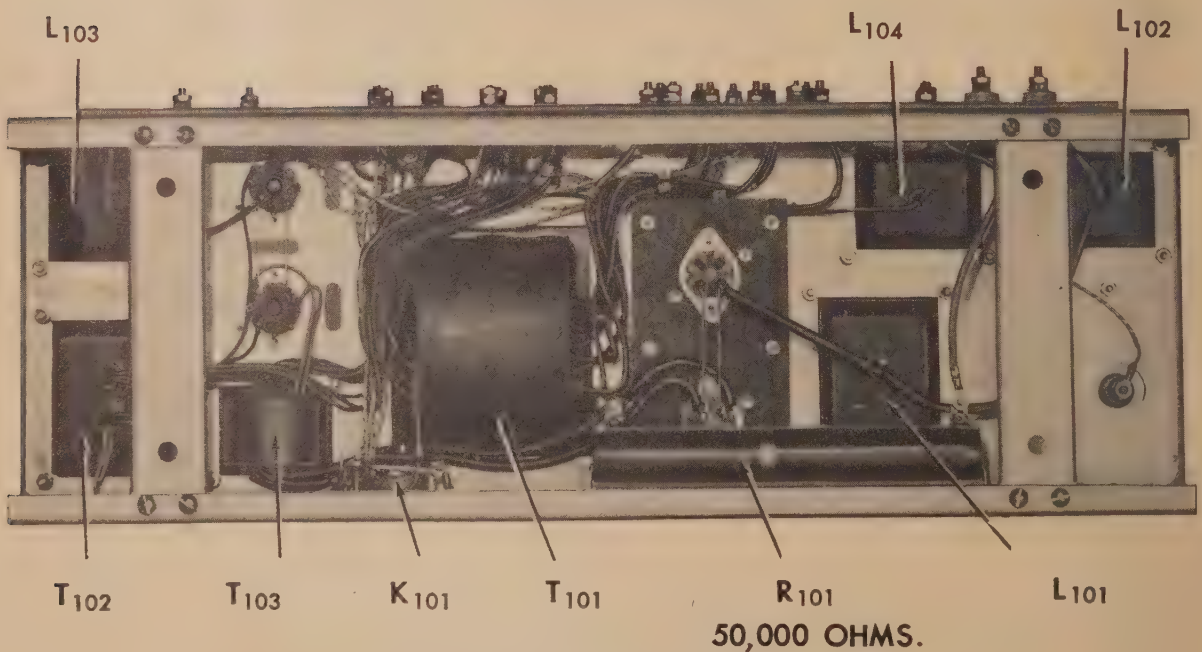
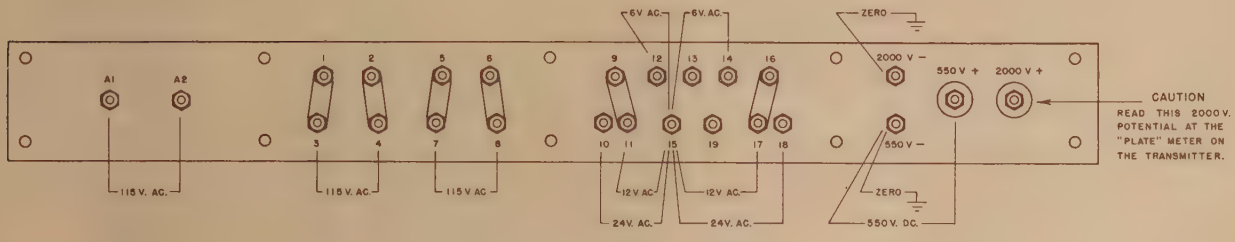


Figure 7-3. Bottom View, Parts Location.

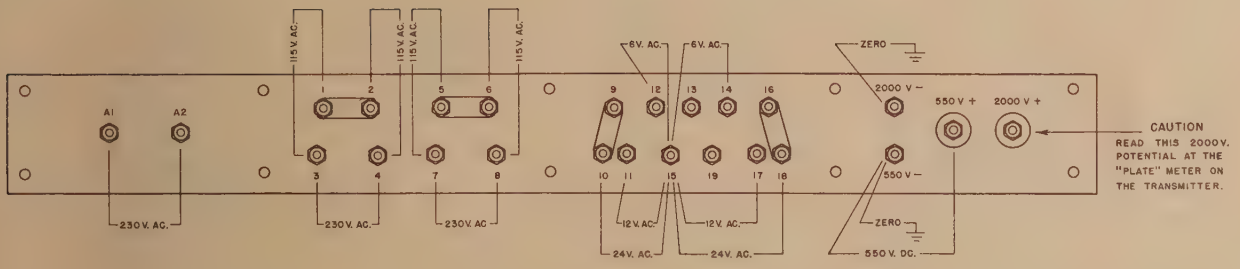
WARNING

NEVER MEASURE POTENTIALS IN EXCESS OF 1000 VOLTS BY MEANS OF FLEXIBLE TEST LEADS OR PROBES



NOTES–
1. LINE VOLTAGE – 115 V. AC.
2. ALL VOLTAGE MEASUREMENTS WERE TAKEN WITH A 1000 OHM / VOLT METER.
3. VOLTAGE READINGS WERE TAKEN WITH THE UNIT INSTALLED AND CONNECTED IN THE TRANSMITTER.
4. "PLATE" VOLTAGE CONTROL SET AT POSITION 5.

Figure 7-4. Terminal Board Voltage Chart, 115 V. AC.



NOTES–
1. LINE VOLTAGE – 230 V. AC.
2. ALL VOLTAGE MEASUREMENTS WERE TAKEN WITH A 1000 OHM / VOLT METER.
3. VOLTAGE READINGS WERE TAKEN WITH THE UNIT INSTALLED AND CONNECTED IN THE TRANSMITTER.
4. "PLATE" VOLTAGE CONTROL SET AT POSITION 5.

Figure 7-5. Terminal Board Voltage Chart, 230 V. AC.

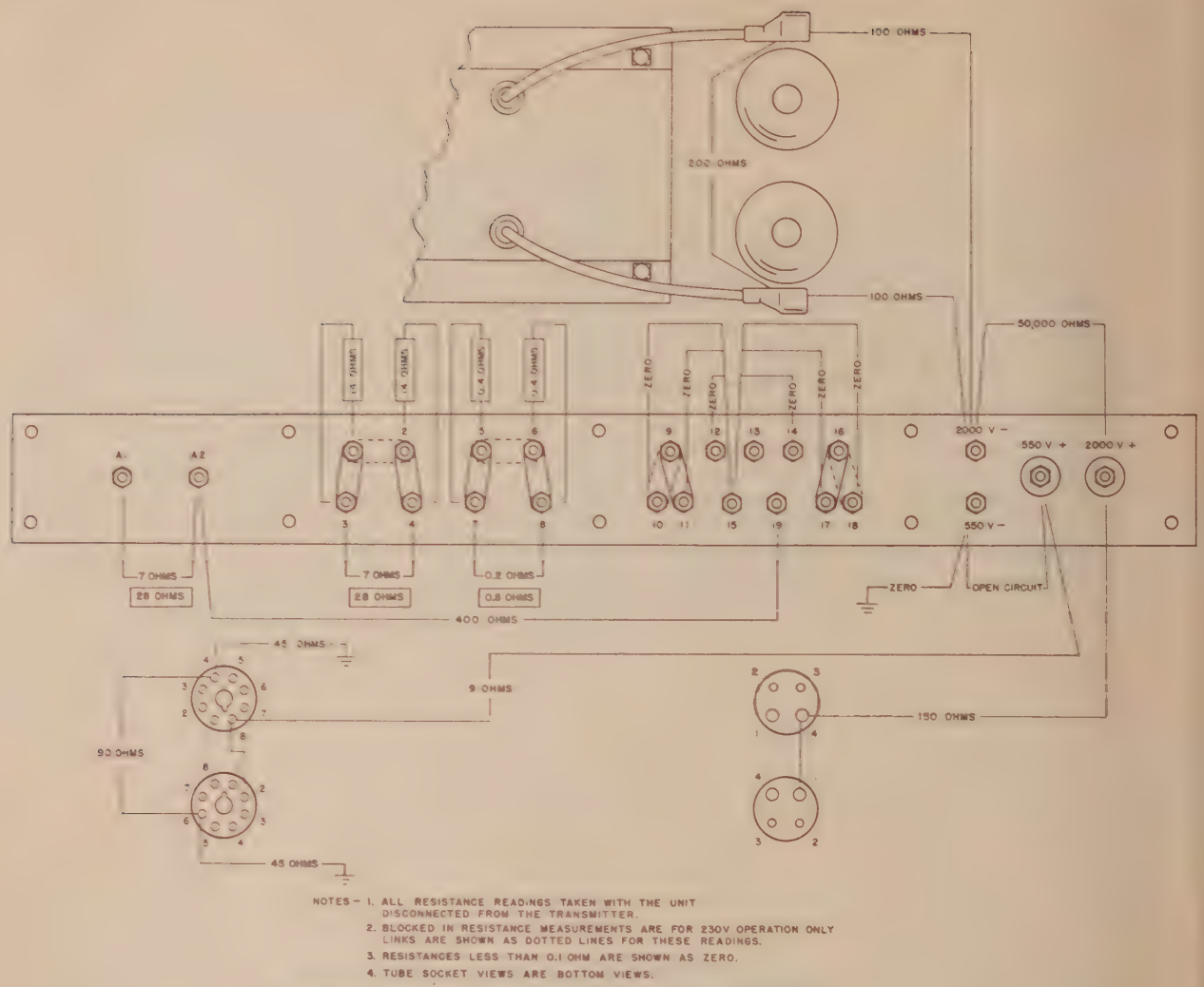


Figure 7-6. Terminal Board Resistance Chart.

2. RELAY MAINTENANCE.

The starting relay K-101 has no mechanical adjustments and only an occasional cleaning of the contacts will be required as the contacts do not make or break the current at any time. The contacts should be cleaned and inspected whenever a major overall check of the entire transmitter is undertaken.

3. TUBE MAINTENANCE.

The four rectifier tubes employed by the power supply are to be checked when routine tube checks are made on the entire transmitter. Failing rectifier tubes will generally show signs of poor voltage regulation or fail to deliver the normal load current, as indicated by the P.A. PLATE meter (current), PLATE meter (voltage), and I.A. PLATE meter (current).

Note

ALL TUBES OF A GIVEN TYPE SUPPLIED WITH THE EQUIPMENT SHALL BE CONSUMED PRIOR TO EMPLOYMENT OF TUBES FROM GENERAL STOCK.

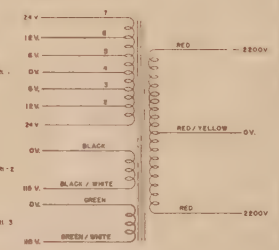
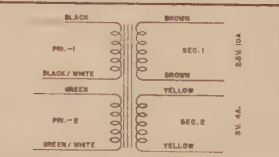
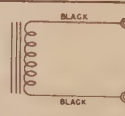
TABLE 7-2. TUBE OPERATING VOLTAGES AND CURRENTS

TUBE TYPE	FUNCTION	CATHODE VOLTAGE (V. D.C.)	CATHODE CURRENT (MA. D.C.)	FILAMENT VOLTAGE (V. A.C.)
JAN-866A/866	Rectifier	2020	215	2.5
JAN-5R4GY	Rectifier	580	300	5.0

TABLE 7-3. TUBE CHARACTERISTICS

TUBE TYPE	SUPPLY FREQUENCY (Cycles)	PEAK INVERSE PLATE VOLTAGE (Volts)	PEAK PLATE CURRENT (Amperes)	AVERAGE PLATE CURRENT (Amperes)	TUBE VOLTAGE DROP (Volts)
JAN-866A/866	150	10,000	1.0	0.25	15
JAN-5R4GY		2100	0.650 (per plate)	0.25	

TABLE 7-4. WINDING DATA

DESIGNATION SYMBOL	HA. PART NO.	DIAGRAM	WINDING	WIRE SIZE	TURNS	D.C. RESISTANCE IN OHMS	IMPEDANCE RATIO	HIPOT A-C VOLTS	REMARKS
K-101	21B078			No. 35E	4500	400			
L-101	56C089		Single	No. 27E	2400	108		5400	Vacuum varnish impregnation.
L-102	56C090		Single	No. 27E	1550	50		5400	Vacuum varnish impregnation.
L-103	56C091		Single	No. 26E	1500	50		2400	Vacuum varnish impregnation.
L-104	56C092		Single	No. 26E	1500	50		2400	Vacuum varnish impregnation.
T-101	52D154		PRI. NO. 1 PRI. NO. 2 PRI. NO. 3 SECONDARY	No. 12E No. 15E No. 15E No. 27E	† 32 76 76 3080	 0.35 0.35 2.00		1600 1600 1600 5400	LOAD VOLTAGE 24 V.—OV.—24 V. 115 V. 115 V. 4400 V. C.T. Vacuum varnish impregnation.
T-102	52C155		PRI. NO. 1 PRI. NO. 2 SECONDARY	No. 21E No. 21E No. 28E	168 168 2160	2.125 2.125 122		1600 1600 2400	LOAD VOLTAGE 115 V. 115 V. 1400 V. C.T Vacuum varnish impregnation.
T-103	52C156		PRI. NO. 1 PRI. NO. 2 SEC. NO. 1 SEC. NO. 2	No. 29E No. 29E No. 13E No. 17E	372 372 9 18	14 14		1600 1600 5400 2400	LOAD VOLTAGE/CURRENT 115 V. 115 V. 2.5 V./10 A. 5 V./4 A. Vacuum varnish impregnation.
STARTING RELAY COIL	51A1056		Single	No. 28E	1300	39			This coil replaces starting contractor coils * K-501A, * K-502A, * K-503A, and * K-504A.

* Note—Refer to Instruction Books for TDE, TDE-1, TDE-2 and TDE-3.
† Tap at 8-12-16-24 turns

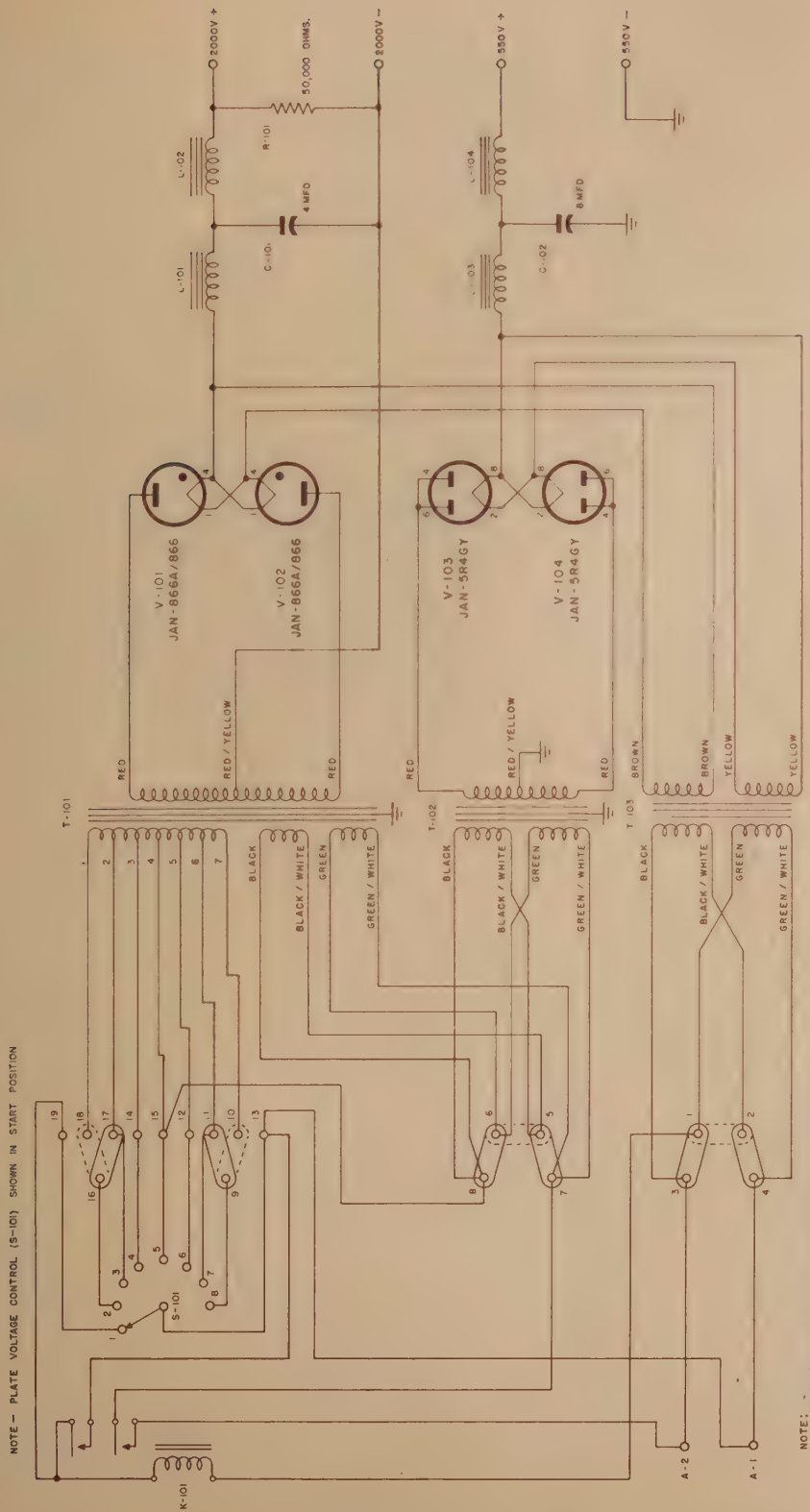


Figure 7-7 Power Supply PP-338/U, Overall Schematic Diagram.

SECTION 8
PARTS LIST

TABLE 8-1. LIST OF MAJOR UNITS

SYMBOL GROUP	QUANTITY	NAME OF MAJOR UNIT	NAVY TYPE DESIGNATION
101 to 199	1	Power Supply	PP-338/U

TABLE 8-2. COMBINED PARTS AND SPARE PARTS LIST

PARTS								SPARE PARTS						
									EQUIP.		TENDER		STOCK	
SYMBOL DESIG.	NAME OF PART AND DESCRIPTION	FUNCTION	JAN AND (NAVY TYPE) NO.	FEDERAL AND (SIGNAL CORPS) STOCK NO.	MFGR. AND MFGR'S DESIGNATION	CONTRACTOR DRAWING & PART NO.	ALL SYMBOL DESIG. INVOLVED	ITEM NUMBER	BOX	QUAN.	BOX	QUAN.	BOX	QUAN.
S-101	SWITCH, rotary: single pole, 8 position; contact rating 10 amp @ 150 vac; contacts silver plated; ceramic body 1¾" diam × ⅞" deep; solder lug term; single hole mtg bushing ⅜-32 × ⅜" lg; shaft 1½" lg × ¼ diam.	PLATE voltage control	241,342		Ohmite 111-8	60B322	S-101							
T-101	TRANSFORMER, power: plate type; input 115/230 v, 60 cycles, single phase; single output winding; output 2000 v DC, full wave, 202 ma; 8½" × 7⅛" × 6-1/32" overall dim; twelve wire leads.	2000 v. plate supply	304,586		Merit Coil & Trans. P-3655	52D154	T-101							
T-102	TRANSFORMER, power: plate type; input 115/230 v, 60 cycles, single phase; single output winding; output 550 v DC, full wave, 300 ma; 6" × 4½" × 3¾" overall dim; seven wire leads.	550 v. plate supply	304,587		Merit Coil & Trans. P-3656	52C155	T-102							
T-103	TRANSFORMER, power: filament type; input 115/230 v, 60 cycles, single phase; 2 output windings; secd #1 — 5 v @ 4 amp; secd #2 — 2.5 v @ 10 amp; 3200 v insulation secd #1, 7800 v insulation secd #2; 4½" × 3⅜" × 2⅛" overall dim; eight wire leads.	Rectifier filament supply	304,588		Merit Coil & Trans. P-3657	52C156	T-103							
V-101	TUBE, electron: JAN-866A/866.	Rectifier (2000 v.)	866A/866		RCA	90J866A/866	V-101 V-102							
V-102	Same as V-101.	Rectifier (2000 v.)												
V-103	TUBE, electron: JAN-5R4GY.	Rectifier (550 v.)	5R4GY		RCA	90J5R4GY	V-103 V-104							
V-104	Same as V-103.	Rectifier (550 v.)												
XV-101	SOCKET, tube: 4 contact; steatite; steel mtg plate molded in body; two mtg slots on 1⅜" centers.	Socket for tube V-101	49,368		Amphenol 49-RSS4	6A295	XV-101 XV-102							
XV-102	Same as XV-101.	Socket for tube V-102												
XV-103	SOCKET, tube: octal; round phenolic body; steel mtg plate molded in body; two mtg holes on 1½" centers.	Socket for tube V-103	49,374-A		Amphenol MIP8	6A019	XV-103 XV-104							
XV-104	Same as XV-103.	Socket for tube V-104												

TABLE 8-2—CONTINUED
COMBINED PARTS AND SPARE PARTS LIST LIST

PARTS								SPARE PARTS						
									EQUIP.		TEN-DER		STOCK	
SYMBOL DESIG.	NAME OF PART AND DESCRIPTION	FUNCTION	JAN AND (NAVY TYPE) NO.	FEDERAL AND (SIGNAL CORPS) STOCK NO.	MFGR. AND MFGR'S DESIG-NATION	CON-TRACTOR DRAWING & PART NO.	ALL SYMBOL DESIG. INVOLVED	ITEM NUMBER	BOX	QUAN.	BOX	QUAN.	BOX	QUAN.
C-101	CAPACITOR, fixed: paper dielectric; 4 mfd +20 —10%; 2500 vdcw; hermetically sealed metal case, $4\frac{5}{16}$" lg × $3\frac{3}{4}$" wd × $4\frac{3}{8}$" h case overall.	Filter	CP70EIDK405V		Incco 8805A	46C143	C-101							
C-102	CAPACITOR, fixed: paper dielectric; 8 mfd +20 —10%; 600 vdcw; hermetically sealed metal case, $3\frac{3}{4}$" lg × $1\frac{1}{4}$" wd × $3\frac{7}{8}$" h case overall.	Filter	CP70EIDF805V		Incco 8795A	46B142	C-102							
E-101	INSULATOR, feed thru: round; glazed steatite; $\frac{3}{4}$" diam × $\frac{5}{16}$" wd overall; $\frac{3}{8}$" diam × $\frac{1}{16}$" thk shoulder; 0.206" diam hole in center.	H. V. insulator	61,659		General Ceramics 1234-00	77A265	E-101 E-102 E-103 E-104							
E-102	Same as E-101.	H. V. insulator												
E-103	Same as E-101.	H. V. insulator												
E-104	Same as E-101.	H. V. insulator												
E-105	BOARD, terminal: 23 term holes 0.196" diam; laminated phenolic; $22\frac{3}{4}$" lg × $2\frac{1}{2}$" wd × $\frac{3}{16}$" thk; ten 0.144" diam mtg holes.	Connector panel			Halli-crafters 88D573	88D573	E-105							
E-106	PLATE, mounting: laminated phenolic; $5\frac{11}{16}$" lg × $3\frac{1}{2}$" wd × $\frac{1}{8}$" thk; two holes 1-17/64" diam to accommodate tube sockets; eight 0.144" diam mtg holes; six 5/32" diam mtg holes.	866A/866 tube socket mounting			Halli-crafters 8B763	8B763	E-106							
E-107	CLIP, tube: glazed ceramic insulation; tinned copper clip; fits $\frac{9}{16}$" diam tube cap.	Tube cap connector for tube V-101			Millen 36001	76A191	E-107 E-108							
E-108	Same as E-107.	Tube cap connector for tube V-102												
H-101	STUD: brass; nickle plated; $1\frac{3}{4}$" lg; threaded 10-32 NF2.	H. V. terminal			Halli-crafters 3A1498	3A1498	H-101 H-102							
H-102	Same as H-101.	H. V. terminal												
H-103	SLEEVE, switch shaft: brass tubing; 0.375" OD × 0.253" ID × $1\frac{7}{16}$" lg.	Adapter for PLATE control knob			Halli-crafters 77A264	77A264	H-103							
H-104	CLAMP, tube: steel; nickle plate over copper; accommodates $1\frac{3}{8}$" diam tube base; $1\frac{13}{16}$ mtg/c; machine screw clamp.	Tube clamp			Incco V-10	76A195	H-104 H-105 H-106 H-107							
H-105	Same as H-104.	Tube clamp												
H-106	Same as H-104.	Tube clamp												
H-107	Same as H-104.	Tube clamp												

| | | |

TABLE 8-2—CONTINUED
COMBINED PARTS AND SPARE PARTS LIST

PARTS								SPARE PARTS							
									EQUIP.		TEN-DER		STOCK	
SYMBOL DESIG.	NAME OF PART AND DESCRIPTION	FUNCTION	JAN AND (NAVY TYPE) NO.	FEDERAL AND (SIGNAL CORPS) STOCK NO.	MFGR. AND MFGR'S DESIG-NATION	CON-TRACTOR DRAWING & PART NO.	ALL SYMBOL DESIG. INVOLVED	ITEM NUMBER	BOX	QUAN.	BOX	QUAN.	BOX	QUAN.
H-126	PLATE, switch: switch mtg; CRS; cadmium pl 3¾" × 3⅜" × 0.059" thk overall; three mtg holes 0.171" diam on 1.562" R 120° apart.	PLATE switch mounting plate			Halli-crafters 63A323	63A323	H-126							
H-127	STUD: steel; cadmium pl; hex cross section; 3½" lg × ½" across flats; threaded 8-32 × ½" deep each end.	PLATE switch mounting stud			Halli-crafters 73A452	73A452	H-127 H-128 H-129							
H-128	Same as H-127.	PLATE switch mounting stud												
H-129	Same as H-127.	PLATE switch mounting stud												
K-101	RELAY, armature: DPST normally open; contact rating 10 amp @ 115 vac and 1½ amp @ 115 vac; 115 vac coil; fast acting; 400 ohms dc resistance; 2-21/32" lg × 1⅝" wd × 1½" h; two 6-32 mtg holes on 2" mtg/c.	Rectifier protection	291,646		Adv Elec 965	21B078	K-101							
L-101	REACTOR, filter: swinging; 8 hy @ 202 ma; 25 hy @ 27 ma; 110 ohms dc resistance; 5½" × 4½" × 3¾" overall dim; two black wire leads.	Input filter, 2000 v.	304,582		Merit Coil & Trans. C-3651	56C089	L-101							
L-102	REACTOR, filter: smoothing; 5 hy @ 202 ma; 50 ohms dc resistance; 5" × 3¾" × 3⅛" overall dim; two black wire leads.	Smoothing filter, 2000 v.	304,583		Merit Coil & Trans. C-3652	56C090	L-102							
L-103	REACTOR, filter: swinging; 4 hy @ 300 ma; 8 hy @ 75 ma; 50 ohms dc resistance; 5" × 3¾" × 3⅛" overall dim; two black leads.	Input filter, 550 v.	304,584		Merit Coil & Trans. C-3653	56C091	L-103							
L-104	REACTOR, filter: smoothing; 5 hy @ 300 ma; 50 ohms dc resistance; 5" × 3¾" × 3⅛" overall dim; two black leads.	Smoothing filter, 550 v.	304,585		Merit Coil & Trans. C-3654	56C092	L-104							
R-101	RESISTOR, fixed: wire wound; 50,000 ohms ±5%; 160 W @ 300° C max; 8½" lg × 1¼" diam; vitreous enamel coat; two terminals.	Bleeder	633,389-5		Resistors Inc. 8½R 50000	24B876	R-101							

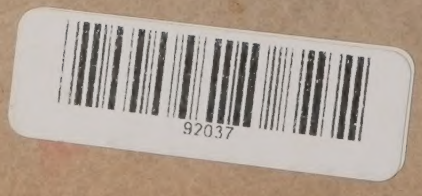
ACCESSORY PARTS

*F-501	FUSE, cartridge: 30 ampere; opens in one hour @ 135% load and opens in eight minutes at 200% load, rated continuous at 110% load; 250 v; one time; fibre body; ferrule terminals; non-indicating; 2" lg × $\frac{9}{16}$" diam overall.	Line Fuse	28,044-30		Bussman NON-30	39A332	*F-501 *F-502
*F-502	Same as *F-501.	Line Fuse					
*K507A	HEATING ELEMENT, electrical: coil type; 7.7 ampere; single section; spiral nichrome wire on mtg base; 1-15/32" × $1\frac{7}{16}$" × 5/8" overall dim; two mtg holes 5/32" diam, $\frac{9}{16}$" mtg/c.	Overload relay element (230 v.)	636,887		Westing-house 966486	21A080	*K-507A *K-508A
*K508A	Same as *K-507A.	Overload relay element (230 v.)					
*K511A	HEATING ELEMENT, electrical; coil type; 16 ampere; single section; formed sheet metal; 1 3/8" × 15/16" × 1/2" overall dim; two mtg holes 5/32" diam, $\frac{9}{16}$" mtg/c.	Overload relay element (115 v.)	636,886		Westing-house 966493	21A079	*K-511A *K-512A
*K-511A	HEATING ELEMENT, electrical: coil type; 18 ampere; single section; formed sheet metal; 1 3/8" × $1\frac{5}{8}$" × 1/2" overall dim; two mtg holes 5/32" diam, $\frac{9}{16}$" mtg/c, substitute for type 636,886 heating element.	Substitute overload relay element (115 v.)	636,895		Westing-house 966494	21A082	K-511A K-512A
*K512A	Same as *K-511A.	Overload relay element (115 v.)					
K-513	COIL, relay: 110 v. AC; line starter type; $2\frac{1}{8}$" × $1\frac{7}{16}$" × $1\frac{7}{16}$" overall dim.	Starting contactor coil. (Replaces coils *K-501-A, *K-502A, *K-503A or *K-504A)			Merit Coil & Trans. C-3826	21A081	K-513
*R-209	RESISTOR, fixed: wire wound; 900 ohms ±10%; 40 w; $4\frac{7}{16}$" lg × 1" diam; vitreous enamel coat; two mtg ferrules $\frac{13}{16}$" diam.	Indicator light resistor	636,897-10		Resistors Inc. $4\frac{7}{16}$ CX900	24B877	*R-209

*Note—Symbols listed in Instruction Books for Navy Models TDE, TDE-1, TDE-2, and TDE-3.

TABLE 8-3. LIST OF MANUFACTURERS

ABBREVIATIONS	PREFIX	NAME	ADDRESS
Adv Elect	CATM	Advance Electric Co.	1260 W. 2nd St., Los Angeles, California
Amphenol	CPH	American Phenolic Corp.	1830 S. 54th St., Cicero, Illinois
Bussman	CFA	Bussman Mfg. Co.	2538 W. University St., St. Louis, Missouri
General Ceramics	CDP	General Ceramics & Steatite Corp.	Keasbet, New Jersey
Hallicrafters	CHL	The Hallicrafters Co.	4401 W. 5th Ave., Chicago, Illinois
Incco	CIE	Industrial Condenser Corp.	3243 N. California Ave., Chicago, Illinois
Merit Coil & Trans.	CYC	Merit Coil & Transformer Corp.	4427 N. Clark St., Chicago, Illinois
Millen	CJA	James Millen Mfg. Co.	150 Exchange St., Malden, Massachusetts
Ohmite	COM	Ohmite Mfg. Co.	4835 W. Flournoy St., Chicago, Illinois
RCA	CRC	R.C.A. Radiatron Corp.	Harrison, New Jersey
Resistors Inc.	CBJM	Resistors Inc.	2241 S. Indiana Ave., Chicago, Illinois
Westinghouse	CAY	Westinghouse Electric Corp.	519 Wilkins Ave., Baltimore, Maryland


92037